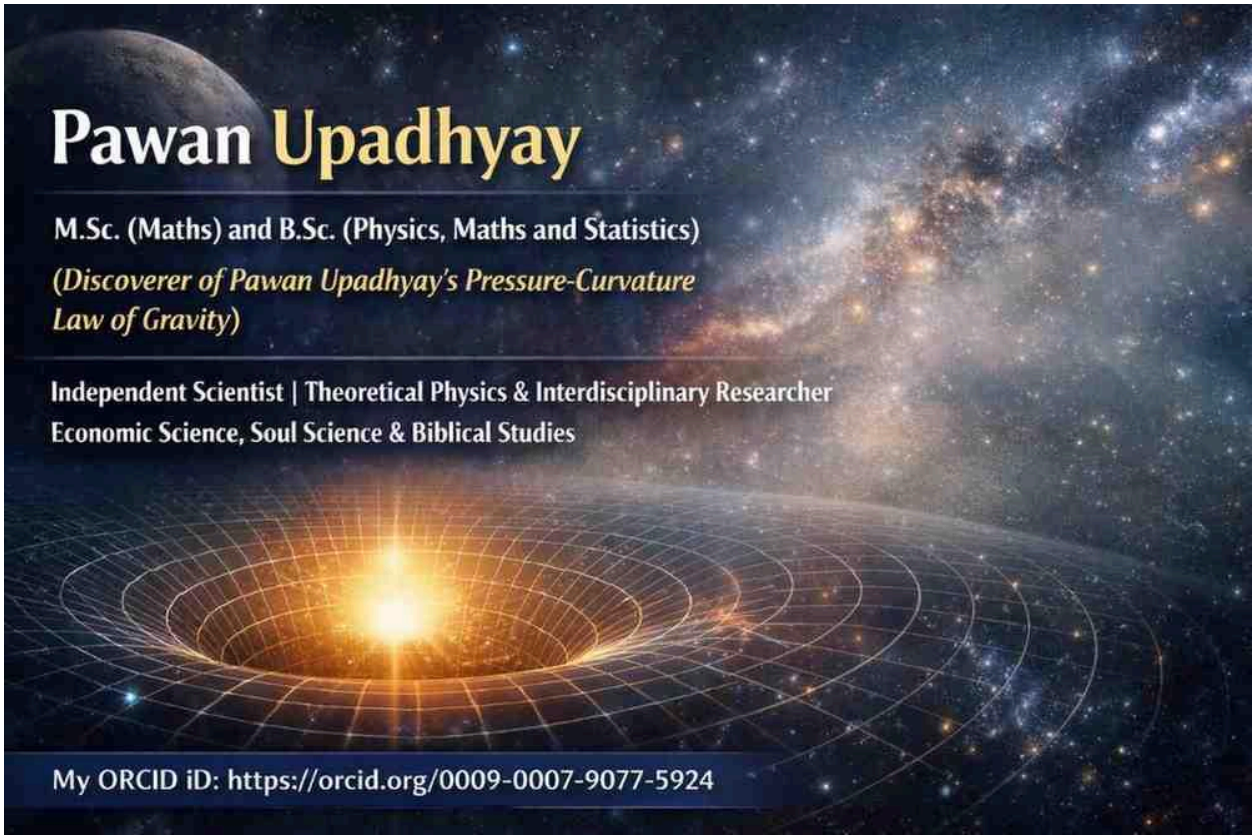
Galaxies and the Multiverse Concept in Pawan Upadhyay's Pressure–Curvature Law of Gravity

Author: Pawan Upadhyay
Affiliation: Independent Researcher
ORCID iD: https://orcid.org/0009-0007-9077-5924
Email: pawanupadhyay28@hotmail.com
Year: 2025



Abstract

Pawan Upadhyay's Pressure–Curvature Law of Gravity (PPC Law) states that pressure generated by mass–energy is the physical cause of spacetime curvature. This paper extends the PPC framework to explain the formation, structure, rotation, and evolution of galaxies, as well as the possibility of a multiverse. In PPC gravity, galaxies emerge as large-scale pressure–curvature systems stabilized by pressure gradients, while cosmic expansion and large-scale separation naturally allow the existence of multiple, causally disconnected pressure–curvature domains. The multiverse, in this interpretation, is not speculative mathematics but a natural outcome of pressure-driven spacetime dynamics.

1. Introduction

Galaxies and the large-scale structure of the universe present some of the most challenging questions in modern cosmology. Standard models rely heavily on dark matter and dark energy to explain galactic rotation and cosmic expansion. While mathematically effective, these concepts lack direct physical explanation.

Pawan Upadhyay's Pressure–Curvature Law of Gravity offers a new approach by identifying pressure as the fundamental physical agent behind curvature. This paper applies the PPC Law to galactic systems and explores how pressure-driven curvature naturally allows the emergence of multiple universes (a multiverse).

2. Fundamental Principle of the PPC Law

The PPC Law is expressed as:

$$P_g = \omega E_d$$

where

- P_g is gravitational pressure,
- E_d is energy density,
- ω is the equation-of-state parameter.

The core causal chain is:

$$\text{Mass–Energy} \rightarrow \text{Pressure} \rightarrow \text{Curvature} \rightarrow \text{Motion}$$

In this framework, curvature is a consequence of pressure, not an independent primary entity.

This principle applies at all scales, including cosmological and trans-cosmological regimes.

3. Formation of Galaxies in the PPC Law

3.1 Initial Matter Condensation

After the early universe cooled, matter began to clump. In PPC terms:

- Slight density variations produced pressure variations
- Pressure gradients created curvature wells
- Matter flowed toward these curvature minima

Thus, galaxies formed as pressure-condensed curvature systems.

3.2 Galaxies as Stable Pressure–Curvature Structures

In PPC gravity:

- A galaxy is a self-organized pressure–curvature equilibrium
- Central regions have higher pressure
- Outer regions experience weaker pressure gradients

This naturally binds stars, gas, and dust into rotating systems.

4. Galactic Rotation Without Dark Matter (PPC View)

One of the key successes of PPC gravity is explaining flat galactic rotation curves.

In PPC:

- Rotation is governed by distributed pressure gradients
- Pressure does not fall off as quickly as visible mass density
- Curvature remains strong in outer regions

Thus:

Galactic stability arises from pressure–curvature distribution, not unseen matter.

This provides a physical alternative to dark matter hypotheses.

5. Galactic Clusters and Large-Scale Structure

Clusters of galaxies form when:

- Pressure fields of individual galaxies overlap
- Combined pressure gradients create larger curvature wells
- Galaxies move within shared pressure–curvature environments

The cosmic web emerges as a network of pressure-connected curvature regions.

6. Cosmic Expansion in PPC Gravity

In the PPC Law:

- Cosmic expansion is pressure-driven
- As matter spreads, global pressure gradients evolve
- Spacetime curvature responds dynamically

This removes the need for an unexplained dark energy component.

7. The Multiverse Concept in the PPC Law

7.1 Definition of Multiverse in PPC

In PPC gravity, a multiverse is defined as:

- Multiple, causally disconnected pressure–curvature domains existing within a larger spacetime framework.

- Each universe corresponds to a distinct pressure–curvature configuration.

7.2 Origin of Multiple Universes

Multiple universes can arise when:

- Pressure fluctuations exceed causal limits
- Spacetime separates into independent curvature domains
- Each domain evolves with its own pressure history

This process is a natural extension of pressure-driven expansion, not speculative physics.

8. Interaction Between Universes

In the PPC framework:

- Universes do not normally interact
- Extremely weak pressure couplings may exist at boundaries
- Such interactions could leave subtle imprints on cosmic background structures

This provides a possible observational pathway.

9. Entropy and the Multiverse

Entropy in PPC gravity is linked to pressure-information content:

- Each universe maximizes entropy internally
- Pressure boundaries separate information domains

The multiverse represents a collection of entropy-isolated systems

10. Comparison with Standard Cosmology

Standard Model: Requires dark matter and dark energy

PPC Law: Uses pressure as the single unifying mechanism

Galaxies, clusters, expansion, and multiverse structure all arise from the same physical cause.

11. Predictions of the PPC Galactic and Multiverse Model

The PPC framework predicts:

- Pressure-based explanations of galactic rotation
- Observable pressure signatures in galaxy clusters
- Non-uniform expansion histories
- Possible anomalies at cosmic boundaries
- Pressure-regulated formation of new universes

These predictions are testable in principle.

12. Conclusion

In Pawan Upadhyay's Pressure–Curvature Law of Gravity, galaxies are stable pressure–curvature systems, and the multiverse emerges naturally from pressure-driven spacetime evolution. By replacing dark components with a single physical mechanism—pressure—the PPC Law provides a unified and intuitive explanation of cosmic structure across all scales. The multiverse, in this view, is not speculative fantasy but a logical outcome of pressure–curvature dynamics.

Final PPC Statement

Galaxies are islands of pressure-stabilized curvature, and the multiverse is a collection of independent pressure–curvature domains born from the same fundamental law.